



Pocket Guide Industrial Controller CM 1

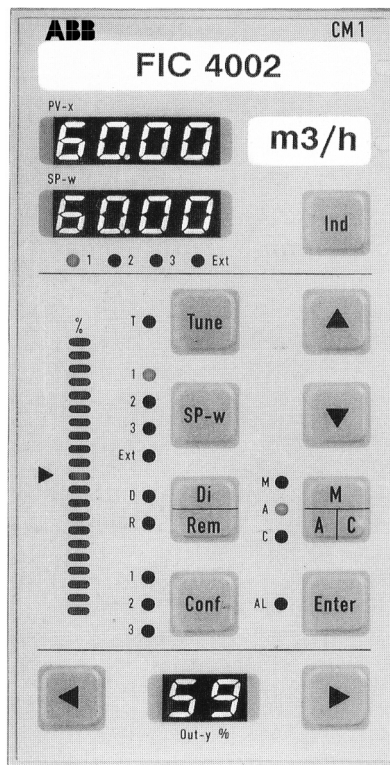
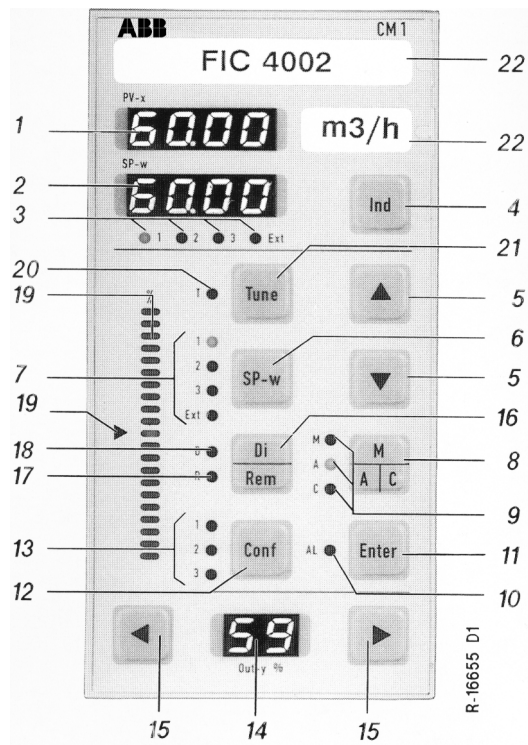


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- 1 Process Value Display
- 2 Setpoint Display
- 3 Displayed Setpoint Indication
- 4 Displayed Setpoint Selection
- 5 Up/Down Keys for Setpoint Modification
- 6 Active Controller Setpoint Selection
- 7 Active Controller Setpoint Indication
- 8 Operating Mode (Manual/Automatic/Cascade) Selection
- 9 Operating Mode Indication
- 10 Alarm Indication
- 11 Entry Confirmation, Alarm Acknowledgement
- 12 Operating Level (1, 2, 3) Selection
- 13 Operating Level Indication
- 14 Output Display
- 15 Up/Down Keys for Output Modification
- 16 Front Panel/Remote Control Selection
- 17 REM Indication
- 18 DI Indication
- 19 Deviation Indication
- 20 TUNE Indication
- 21 TUNE (Self-Tuning of Control Parameters)
- 22 Inscription plates

Software 003x • As of Data 07.92
 Subject to change without notice

Keys and Displays for Parameter Setting and Configuration

1. Parameter Level 1:


 Press 1 x

2. Parameter Level 2:


 Press 2 x (if password-protected, refer to item 4)



3. Configuration Level

 Press 3 x (if password-protected, refer to item 4)

 press 1 x (if not protected)

4. Password Entry

 Select digit

  Select number



 Confirm password

5. Parameter Entry

Parameter number is shown by Out-Y display
Parameter value can be seen at SP-W display

  Select parameter



 Select digit, move decimal point


  Select number



 Confirm parameter


6 Configuration Data Entry

Function number can be seen at Out-Y display
Question number and answer is shown by SP-W

  Select function

 Select question in a function

  Select answer

 Confirm answer

No.	Parameter	Selectable Values		Preset Value	Units	Resolution
		min.	max.			
00	Software-Revision			003x		
PID 1 Parameters						
01	Proportional gain Kp	0.01	99.99	1.00	-	0.01
02	Reset rate Ki	0.00	9999	10.00	1/min	0.001
03	Derivative amplif. Kv	0.00	99.99	4.00	-	0.01
04	Derivative time TD	0.00	99.99	0.00	min	0.01
05	Manual reset of P and PD controllers	0.01	99.99	50.00	%	0.01
06	SCAN time	0.050	99.99	0.050	sec	0.01
PID 2 Parameters (only Secondary Controller, Cascade Control)						
08	Proportional gain Kp	0.01	99.99	1.00	-	0.01
09	Reset rate Ki	0.00	9999	10.00	1/min	0.001
10	Derivative amplif. Kv	0.00	99.99	4.00	-	0.01
11	Derivative time T _D	0.00	99.99	0.00	min	0.01
12	Manual reset of P and PD controllers	0.01	99.99	50.00	%	0.01
Parameters 3-Point Step Control Output						
14	Motor run time	1.00	1000.	60.00	sec	0.001
15	Min. pulse length	0.00	1.00	0.10	sec	0.01
16	Min. pause length	0.00	1.00	0.10	sec	0.01
Feedforward Parameters						
18	Lead amplif. Kvs	0.01	99.99	1.00	-	0.01
19	Lead time T _{Ds}	0.01	99.99	0.01	min	0.01
Analog Input Scaling						
20	AI 1 - Start of range	0.00	80.00	00.00	%	0.01 %
21	AI 1 - End of range	20.00	99.99	99.99	%	0.01 %
22	AI 2 - Start of range	0.00	80.00	00.00	%	0.01 %
23	AI 2 - End of range	20.00	99.99	99.99	%	0.01 %
24	AI 3 - Start of range	0.00	80.00	00.00	%	0.01 %
25	AI 3 - End of range	20.00	99.99	99.99	%	0.01 %
26	AI 4 - Start of range	0.00	80.00	00.00	%	0.01 %
27	AI 4 - End of range	20.00	99.99	99.99	%	0.01 %
Display Ranges						
30	PV and SP displ. min	-999	9999	0.0	EU	0.001
31	PV and SP displ. max	-999	9999	99.99	EU	0.001
32	PV ₂ /SP ₂ display min	-999	9999	0.0	EU	0.001
33	PV ₂ /SP ₂ display max	-999	9999	99.99	EU	0.001
Limits						
35	PV min-min (LoLo)	-999	9999	-999	EU	0.001
36	PV min (Lo)	-999	9999	-999	EU	0.001
37	PV max (Hi)	-999	9999	9999	EU	0.001
38	PV max-max (HiHi)	-999	9999	9999	EU	0.001
39	Dev. min-min (LoLo)	0.000	9999	9999	EU	0.001
40	Dev. min. (Lo)	0.000	9999	9999	EU	0.001
41	Dev. max (Hi)	0.000	9999	9999	EU	0.001
42	Dev. max-max (HiHi)	0.000	9999	9999	EU	0.001
Setpoint PID 1 (Primary Controller)						
45	Ramp, increasing	0.00	9999	9999	EU/sec	0.001
46	Ramp, decreasing	0.00	9999	9999	EU/sec	0.001
47	Min (Lo) limit	-999	9999	-999	EU	0.001
48	Max (Hi) limit	-999	9999	9999	EU	0.001
Setpoint PID 2						
49	Ramp, increasing	0.00	9999	9999	EU/sec	0.001
50	Ramp, decreasing	0.00	9999	9999	EU/sec	0.001
51	Min (Lo) limit	-999	9999	-999	EU	0.001
52	Max (Hi) limit	-999	9999	9999	EU	0.001

No.	Parameter	Selectable Values		Preset Value	Units	Resolution
		min.	max.			
00	Software-Revision			003x		
Output						
53	Out hold time	0.01	99.99	0.50	sec	0.01
54	Ramp, increasing	0.000	9999	9999	%/sec	0.001
55	Ramp, decreasing	0.000	9999	9999	%/sec	0.001
56	Min (Lo) limit	-9.0	109.0	-9.0	%	0.1
57	Max (Hi) limit	-9.0	109.0	109.0	%	0.1
58	Safe value S1	-9.0	109.0	50.0	%	0.1
59	Safe value S2	-9.0	109.0	50.0	%	0.1
RATIO / BIAS						
60	Min RATIO value for AI = 0 %	0.01	99.99	0.10	-	0.01
61	Max. RATIO value for AI=100%	0.01	99.99	1.00	-	0.01
62	Min RATIO display	0.001	9999	0.100	-	0.001
63	Max RATIO display	0.001	9999	1.000	-	0.001
64	Min BIAS value for AI=0 %	-999	9999	0.000	EU	0.001
65	Max BIAS value. for AI=100 %	-999	9999	9999	EU	0.001
Digital Low-Pass Filter						
66	Input AI 1	0.00	99.99	0.00	sec	0.01
67	Input AI 2	0.00	99.99	0.00	sec	0.01
68	Input AI 3	0.00	99.99	0.00	sec	0.01
69	Input AI 4	0.00	99.99	0.00	sec	0.01
Linearization						
70	Input 10 %	0.000	0.999	0.100	%	0.001
71	Input 20 %	0.000	0.999	0.200	%	0.001
72	Input 30 %	0.000	0.999	0.300	%	0.001
73	Input 40 %	0.000	0.999	0.400	%	0.001
74	Input 50 %	0.000	0.999	0.500	%	0.001
75	Input 60 %	0.000	0.999	0.600	%	0.001
76	Input 70 %	0.000	0.999	0.700	%	0.001
77	Input 80 %	0.000	0.999	0.800	%	0.001
78	Input 90 %	0.000	0.999	0.900	%	0.001
Self-Tuning PID 1 (Primary Controller)						
80	Identification time	0.05	99.99	1.00	sec	0.01
81	Amount of change	0.00	99.99	5.00	%	0.01
Self-Tuning PID 2						
84	Identification time	0.05	99.99	1.00	sec	0.01
85	Amount of change	0.00	99.99	5.00	%	0.01
Pressure and Temperature Compensation						
90	Calc. temperature	-999	9999	0.00	EU	0.001
91	Calc. pressure	0.000	9999	0.00	EU	0.001
92	Scaling temperature compensation 0%	-999	9999	0.00	EU	0.001
93	Scaling temperature compensation 100%	-999	9999	0.00	EU	0.001
94	Scaling pressure compensation 0%	-999	9999	0.00	EU	0.001
95	Scaling pressure compensation 100%	-999	9999	0.00	EU	0.001
TAG Number Entry (only for System-integrated CM1)						
98	Characters			...	-	
99	Numbers	0	9999	0	-	
Password						
h0	Password entry	0000	9999	0000	-	1

Function	Question	Answer	Description	Preset Value
01	1	0	PID 1 Control Direct action: increasing deviation-> increasing OUT	1
		1	Reverse action: increasing deviation -> decreas. OUT	
	2	0	No derivative	0
		1	Derivative of PV	
	3	2	Derivative of DEV	0
		0	No (Integral) reset	
	4	1	(Integral) reset of deviation	0
		0	Without start-up function	
	5	1	With start-up function	0
		0	Without self-tuning function	
1	1	With self-tuning function	0	
	0	Without self-tuning function		
02	1	0	PID 2 Control Unused	0
		1	As a secondary controller	
		2	As an override controller, MINIMUM selection	
	2	3	As an override controller, MAXIMUM selection	0
		0	Control action:Direct: increasing dev. -> increasing OUT Reverse: increasing dev. -> decreasing OUT	
	3	1	No derivative	0
		0	Derivative of PV	
	4	2	Derivative of DEV	1
		0	No (integral) reset	
	5	1	(Integral) reset of DEV	0
		0	Without start-up function	
	6	1	With start-up function	0
		0	Without self-tuning	
	7	1	With self-tuning	0
		0	Use of limits	
1	0	Limits are not used	0	
	1	Limits are used		
03	1	0	Controller Mode Modification Automatic only, restart with last output	1
		1	Man/Auto/Casc. - Manual change-over, bumpless in both directions (casc. only 02/1.1) restart with last output	
		2	Man/Auto/Casc., add. setpoint tracking in manual mode restart with last output	
		3	Man/Auto/Casc., but restart in manual mode with last output	
		4	Man/Auto/Casc., add. setpoint tracking in manual mode, but restart in manual mode with last output	
		5	DDC control (+ SP tracking for DDC control)	
04	1	0	Output, Output Display Output : 0...20 mA display : 0...100 %	0
		1	Output : 0...20 mA display : 100...0 %	
		2	Output : 4...20 mA display : 0...100 %	
		3	Output : 4...20 mA display : 100...0 %	
		4	3 PS, internal reset and OUT to AO	
		5	3 PS, external reset and OUT to AO	
		6	3 PS, internal reset and PV to AO	
	2	7	3 PS, external reset and PV to AO	0
		0	Output limiting in automatic mode, only	
		1	Output limiting in automatic, cascade and manual mode	
05	1	0	Control Mode and Setpoint Selection Standard, with setpoint SP1	0
		1	Standard, with SP 1 and SP2	
		2	Standard, with SP 1, SP 2 and SP 3	

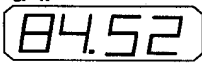
Function	Question	Answer	Description	Preset Value
		3	External SP control without change-over	
		4	Standard/follow-up control, with SP 1	
		5	Standard/follow-up control, with SP 1 and SP 2	
		6	Standard/follow-up, with SP 1, Sp 2 and SP 3	
		7	Standard/follow-up, with SP tracking for follow-up	
		8	Standard/ratio, with SP 1	
		9	Standard/ratio, with SP 1 tracking for ratio	
	2	0	No pressure compensation of process value	0
		1	Pressure compensation [PSIG]	
		2	Pressure compensation [BAR, absolute]	
	3	0	No temperature compensation of process value	0
		1	Temperature compensation [FAHRENHEIT]	
		2	Temperature compensation [CELSIUS]	
06			Local / Remote Control	
	1	0	LOCAL (local control via front panel)	0
		1	DI (control via discrete inputs)	
		2	REMOTE (control via serial interface)	
		3	DI/REMOTE (control via serial interface and DI)	
			Disable REMOTE/DI (DI/REM key)	
	2	0	not allowed	
		1	allowed (change-over from DI/REMOTE to LOCAL and vice versa)	1
07			Feedforward	
	1	0	No disturbance input	0
		1	To PV, direct action	
		2	To PV, reverse action	
		3	To OUT, direct action	
		4	To OUT, reverse action	
08			Analog Input Conversion	
	1	0	AI 1 - No input conversion	0
		1	Square root extraction	
		2	Linearization, adjustable by parameters no. 70 ... 78	
	2	0	AI 2 - No input conversion	0
		1	Square root extraction	
		2	Linearization, adjustable by parameters no. 70 ... 78	
	3	0	AI 3 - No input conversion	0
		1	Square root extraction	
		2	Linearization, adjustable by parameters no. 70 ... 78	
		3	RTD Pt100 range I (-50...150°C) (-58...302°F)	
		4	RTD Pt100 range II (-50...600°C) (-58...1112°F)	
		5	TC type J range II (0...1200 °C) (32...2192°F)	
		6	TC type J range I (0...400 °C) (32...752°F)	
		7	TC type E range II (0...1000 °C) (32...1832°F)	
		8	TC type E range I (0...250 °C) (32...482°F)	
		9	TC type K range II (0...1300 °C) (32...2372°F)	
		10	TC type K range I (0...600 °C) (32...1112°F)	
		11	TC type L range II (0...900 °C) (32...1652°F)	
		12	TC type L range I (0...400 °C) (32...752°F)	
		13	TC type U range II (0...600 °C) (32...1112°F)	
		14	TC type U range I (0...400 °C) (32...752°F)	
		15	TC type R range I (0...1700 °C) (32...3092°F)	
		16	TC type S range I (0...1700 °C) (32...3092°F)	
		17	TC type T range I (0...400 °C) (32...752°F)	
		18	TC type B range I (0...1800 °C) (32...3272°F)	
		19	Retransmitting slidewire	
	4	0	Analog input conversion, AI 4	0
		0-19	See AI 3, answers 0...19	
	5		Reaction to disturbances affecting AI 3	
		0	Input = 0 % (for Pt100, TC, retransm. slidew.)	0
		1	Input = 100 %	
	6		Reaction to disturbances affecting AI 4	
		0	Input = 0 % (for Pt100, TC, retransm. slidew.)	0
		1	Input = 100 %	

Function	Question	Answer	Description	Preset Value
09	1	0	Analog Input Assignment	
		1	Analog Input AI 1	
		2	Unused	
		3	Process value PV	1
		4	Setpoint SPext	
		5	Feedforward	
		6	DDC input OUT ext	
		7	Min (Lo) limit for OUT	
		8	Max (Hi) limit for OUT	
		9	PID reset, EXTERNAL RESET	
		10	RATIO	
		11	BIAS	
		12	Secondary process value PV 2	
09	2	13	Temperature compensation	
		0-13	Pressure compensation	
		0-13	External reset 3-point step control	
		0-13	Analog Input AI 2	
		0-13	Analog Input AI 3	
10	1	0	Analog Input AI 4	
		1	See AI 1, answers 0 ... 13	0
		2	Analog Input AI 2	
		3	See A 1, answers 0 ... 13	0
		4	Analog Input AI 3	
		5	See A 1, answers 0 ... 13	0
		6	Analog Input AI 4	
		7	See AI 1, answers 0 ... 13	0
		8	Functions of Discrete Inputs	
		9	DI 1 - Unused	
		10	Change-over SP 1 <-> SP 2	
		11	Change-over SP 2 <-> SP 3	
		12	Change-over standard control <-> follow-up control or standard control <-> ratio control	
13	Change-over automatic <-> manual			
14	Change-over automatic <-> cascade			
15	Change-over automatic <-> DDC			
16	Change-over to safe value Y S-1			
17	Change-over to safe value Y S-2			
18	Change-over to safe value Y S-1 w. interlocking			
10	2	0	Change-over to safe value Y S-2 w. interlocking	
		1	Setpoint ramp OFF	
		2	Change-over PID 1 control action	
		3	Locking of parameters/ configuration data	
		4	Change-over AI 1 <-> AI 2	
		5	Change-over AI 3 <-> AI 4	
		6	SP adjustment enabled <-> disabled	
		7	OUT adjustment enabled <-> disabled	
		8	ENTER for Alarm Acknowledgement	
		9	DI 2 - Unused	0
		10	0-18 See DI 1, answers 0 ... 18	
		11	DI 3 - Unused	0
		12	0-18 See DI 1, answers 0 ... 18	
13	DI 4 - Unused	0		
14	0-18 See DI 1, answers 0 ... 18			
15	DI 5 - Unused	0		
16	0-18 See DI 1, answers 0 ... 18			
10	3	0	Action of DI 1	
		1	Direct	
		2	Reverse	
		3	Action of DI 2	0
		4	See DI 1, answers 0 and 1	
		5	Action of DI 3	0
		6	See DI 1, answers 0 and 1	
		7	Action of DI 4	0
		8	See DI 1, answers 0 and 1	
		9	Action of DI 5	0
		10	See DI 1, answers 0 and 1	
		11	Action of DI 5	0
		12	See DI 1, answers 0 and 1	







Function	Question	Answer	Description	Preset Value	
11	1	0	Functions of Discrete Outputs	0	
		1	Min-min (LoLo) limit for PV - No alarm Discrete output DO 1 (not with 3-point step control)		
		2	Discrete output DO 2 (not with 3-point step control)		
		3	Discrete output DO 3		
		4	Discrete output DO 4		
		0	Min (Lo) limit for PV		
		0-4	See question 1, answers 0-4		
		0	Max (Hi) limit for PV		
		0-4	See question 1, answers 0-4		
		0	Max-max (HIHI) limit for PV		
		0-4	See question 1, answers 0-4		
		0	Min-min (LoLo) limit for deviation		
		0-4	See question 1, answers 0-4		
		0	Min (Lo) limit for deviation		
		0-4	See question 1, answers 0-4		
		0	Max (Hi) limit for deviation		
0-4	See question 1, answers 0-4				
0	Max-max (HIHI) limit for deviation				
0-4	See question 1, answers 0-4				
0	Alarm summary				
0-4	See question 1, answers 0-4				
0	Action DO 1 (not with 3-point step control)	0			
1	If process value > limit -> relay contact closed				
0	If process value > limit -> relay contact open	0			
1	Action DO 2 (not with 3-point step control)				
0-1	See question 10, answers 0 and 1	0			
0	Action DO 3				
0-1	See question 10, answers 0 and 1	0			
0	Action DO 4				
0-1	See question 10, answers 0 and 1	0			
0	Relay opens				
1	After alarm end				
0	After acknowledgement	1			
2	After acknowledgement and alarm end				
0	Keep-alive, self-test	0			
0-4	See question 1, answers 0-4				
0	DO activation after alarm acknowledgement	0			
0-4	See question 1, answers 0-4				
12	1	0	Release of Additional Parameters for Level 1	0	
		1	Parameter no. 00 ... 19		
		0	Parameter no. 20 ... 27		0
		1			
		0	Parameter no. 30 ... 42		0
		1			
		0	Parameter no. 45 ... 52		0
		1			
		0	Parameter no. 53 ... 59		0
		1			
		0	Parameter no. 60 ... 65		0
		1			
		0	Parameter no. 66 ... 69		0
		1			
		0	Parameter no. 70 ... 78		0
		1			
		0	Parameter no. 80 ... 99		0
		1			

Function	Question	Answer	Description	Preset Value
13	1	0	Display Range for Deviation	0
		1	dev. +/- 5 %	
		2	dev. +/- 10 %	
		3	dev. +/- 20 %	
14	1	0	Repetition Rate of PV, Deviation and OUT Displays	1
		1	0.1 seconds	
		2	0.5 seconds	
		3	1 second	
	2	0	Format of PV and SP Displays	2
		1	Floating point display	
		2	1.000 decimal point after 1. digit	
		3	10.00 decimal point after 2. digit	
	3	0	Terminating alarm Indication	1
		1	100.0 decimal point after 3. digit	
		2	1000. decimal point after 4. digit	
		3	Without acknowledgement (when alarm ends)	
	4	0	Format of PV 2 and SP 2 display	2
		1	Without acknowledgement	
		2	with acknowledgement	
		3	without Display and acknowledgement	
	5	0	Changeover SP-W 1 .. SP-W Ext	1
		1	Floating point display	
		2	1.000 decimal point after 1. digit	
		3	10.00 decimal point after 2. digit	
15	1	0	Communication	0
		1	Station Number for Communication	
		2	No communication	
		31	Communication under number 1	
	2	0	Interface Baud Rate	3
		1	Communication under number 31	
		2	1200 bauds	
		3	2400 bauds	
	3	0	Interface Parity	2
		1	4800 bauds	
		2	9600 bauds	
	4	0	Data Word Length	0
		1	No	
		2	Odd	
	5	0	Stop Bits	0
		1	Even	
		2	7 bits	
	6	0	Type of Interface	0
		1	8 bits	
		2	1.5 bits	
	7	0	Communication Protocol	1
		1	2 bits	
		2	RS 232	
	7	0	Communication Protocol	1
		1	RS 422	
		1	ASCII	
	7	0	Communication Protocol	1
		1	RS 485	
1		RTU		

Keys and Displays for Cascade Control

SP-W

○1 ●2 ●3 ●Ext

1 = Internal setpoint of primary controller
2 = Setpoint of secondary controller
3 = Process value of secondary controller
Ext. = External setpoint of primary controller

-  Increase setpoint
-  Decrease setpoint
-  Change over SP-W display
-  Select MANUAL, AUTOMATIC, CASCADE mode
-  Select external/internal setpoint of primary controller
-  Modify output value in MANUAL mode

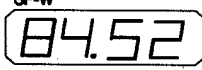
Additional Configuration for Cascade Control

02/1.1 With secondary controller
02/2.0 o. 1 Select secondary controller's direction of action
08/x.y Select linearization of AOx for PV2
09/x.10 Analog input assignment for PV2







Additional Parameters for Cascade Control

#20 ... #27 Analog input scaling
#32 ... #33 Scaling of display ranges for PV2 and SP2

Keys and Displays for Ratio Control

SP-W

○1 ●2 ●3 ●Ext

1 = Internal setpoint of ratio controller
2 = RATIO (Limit parameters #62 ... #63)
3 = BIAS (Limit parameters #64 ... #65)
Ext. = External setpoint of ratio controller

-  Increase setpoint, RATIO, BIAS
-  Decrease setpoint, RATIO, BIAS
-  Change over SP-W display
-  Select MANUAL / AUTOMATIC mode
-  Select external/internal setpoint for standard/ratio control
-  Modify output value in MANUAL mode

Additional Configuration for Ratio Control

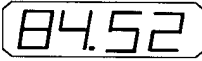
05/1.8 o.9 Standard/ratio control
08/x.y Select linearization of AOx for SPext
09/x.2 Analog input assignment for SPext

Additional Parameters for Ratio Control

#20 ... #27 Analog input scaling
#60 ... #65 Limits for RATIO and BIAS

Keys and Displays for Override Control








SP-W



1 = Internal setpoint of primary controller
 2 = Setpoint of override controller *)
 3 = Not used
 Ext. = External setpoint of primary controller

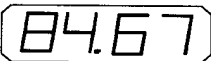
○1 ●2 ●3 ●Ext

*) at the same time, the override controller process value is shown by the PV-X display.


-  Increase setpoint
-  Decrease setpoint
-  Change over SP-W display
-  Select MANUAL / AUTOMATIC mode
-  Select external / internal setpoint of primary controller
-   Modify output value in MANUAL mode

Keys and Displays for Alarm Acknowledgement

PV-X





Flashes if PV-limits are violated
 if DEV limits are violated



SP-W display shows for function 02/7.0

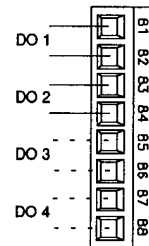
hh when PV, DEV maxmax is violated	h2 when PV2, DEV2 max is violated
h when PV, DEV max is violated	h1 when PV, DEV max is violated
l when PV, DEV min is violated	l1 when PV, DEV min is violated
ll when PV, DEV minmin is violated	l2 when PV2, DEV2 min is violated

-  Press 1 x for alarm acknowledgement
-  Press for 3 seconds to display active alarms again

Terminal Assignment (basic CM 1 version)

1	+ Discrete input 1
2	+ Discrete input 2
3	+ Discrete input 3
4	+ Discrete input 4
5	+ Discrete input 5
6	Zero (ground)
7	+ Analog input 1
8	- Analog input 1
9	+ Analog input 2
10	- Analog input 2
11	+ Analog output
12	- Analog output
13	Not used
14	+ Supply voltage

Terminal assignment Limit module



Terminal assignment Pt-100 module in 3-wire connection

